Tier 2 Center Considerations

- **MRE/IT proposal - main components**
  - **Computing hardware at universities**
    - **Tier 2 (3?) centers**
  - **Networking**
  - **R+D for these**
    - **Computing grids**
    - **Tier 2 system**
- **Other components (based on feedback)**
  - **Limited core software**
  - **Training (?)**

Possible model for Tier 2's

- Center for specific analyses
  - Constants for specific application
    - e.g. alignment, r-t relations
    - follows hardware commitments
  - Specific analyses
    - Full data set of a given trigger
    - Monte Carlo support
- Try a "bottoms up" approach to scale

Exercise based on CDF

- **Squark/gluino search in missing Et +jets**
  - **2% of overall trigger bandwidth**
  - **Multiple passes (full reconstruction) of data**
  - **Need for full data information**
    - **Development of background rejection**
    - **Issues - could be developed on a subset?**
- **Extrapolate equivalent analysis to ATLAS**

Missing Et Exercise

- **Assume:**
  - **MET stream is 2% of bandwidth**
  - **CPU numbers quoted in physics TDR**
    - **Substantial variation in tracking time**
      - **Nearly 3 orders of magnitude variation**
      - **Take 700 SpecINT95 seconds**
  - **1 Mbyte event size**
  - **2 years of running at high luminosity**

CDF/ATLAS

	CDF I	CDF II	ATLAS
Number of events	3.2M	30M	40M
CPU Tot. SpI95*s	55.4M	900M	28,000M
Data Tot. (Bytes)	100 GBytes	4.2 TBytes	40 TBytes

The Details

	CDF Run I	CDF Run II	ATLAS
CPU time/evt (SpectINT95)	17.3	30	700
Trigger Rate (Hz)	8	75	100
Fraction of Trigger Stream	0.02	0.02	0.02
Event size (Bytes)	3.00E+04	1.40E+05	1.00E+06
Years running	2	2	2
Sec/year	1.00E+07	1.00E+07	1.00E+07
Events Total	3.20E+06	3.00E+07	4.00E+07
Total CPU (SpI95*sec)	5.54E+07	9.00E+08	2.80E+10
Total Data (Bytes)	9.60E+10	4.20E+12	4.00E+13
Fraction of Tier 2 CPU	2.13E-04	3.46E-03	1.08E-01
Fraction of Tier 2 tape	0.10%	4.20%	40.00%
Fraction of Tier 2 disk	0.24%	10.50%	100.00%
Tier 2 CPU (SpI95)	2.60E+04		
Total Available CPU/year	2.60E+11		
Robotic tape capacity	1.00E+14		
Plausible disk capacity	4.00E+13		

Tier 2 Capabilities

- **CPU**
  - **26,000 SpecINT95**
  - **Yearly: 2.6E+11 SpecINT95**

Matching of Analysis to Tier 2

- **Assumptions:**
  - **Full reconstruction pass**
  - **Full data set on tape**
- **10% of overall CPU usage**
- **40% of robotic tape storage**
- **IF DST compression factor is 1/10**
  - **Could have entire sample on disk**

Opinions from exercise

- **Model of "delegated" task at at Tier 2 center works**
  - **Assume of order 1-2% of trigger load**
- **Storage capabilities a bit marginal**
  - **Improve, using first pass at Tier 1?**
  - **Analyze using DST's?**

Other Tier 2 Issues

- **Staffing -**
  - From Ian, Marjorie: HPSS requires 4 FTE's to staff
  - Open question: can one make a ***requirement*** that the Tier 2 system be sufficiently automated so that only 1 FTE is required
- **Platforms -**
  - Uniformity: what implications for the sharing of resources within a University/Lab?